S/042/61/016/002/005/005
C 111/ C 222

Anatoliy Alekseyevich Dorodnitsyn ...

Switzerland in 1960. His papers contain essential contributions in the domains: dynamic meteorology, gas dynamics and applied mathematics.

The authors mention N. Ye. Zhukovskiy and S. A. Chaplygin. There is a list containing the publications of A. A. Dorodnitsyn (1936-1960) with 23 titles and a photo of him.

Card 3/3

10.1200 1327, 2607, 3113

26732
S/040/61/025/003/009/026
D208/D304

AUTHORS: Ryzhov, O.S., and Shmyglevskiy, Yu.D. (Moscow)

TITLE: On the property of a supersonic gas flow

PERIODICAL: Akademiya nauk SSR. Otdeleniye tekhnicheskikh nauk. Prikladnaya matematika i mekhanika, v. 25, no. 3, 1961, 453 - 455

TEXT: When gas flow in Laval nozzles is investigated, difficulties are encountered in the construction of flow in the vicinity of the narrowest cross-section, where the transition from subsonic to supersonic velocities takes place, as in that region the motion is described by mixed, elliptic-hyperbolic type equations, whose general properties are not well-known. Solving the supersonic part of flow is simplified if the sonic surface is perpendicular to the lines of flow because it also becomes a characteristic surface and the subsonic region is described by elliptic equations, while the supersonic one is described by hyperbolic ones. In this paper, ge-

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On the property of a supersonic ...

neral conditions are derived, necessary for a transition surface to coincide with the characteristic surface of the gas dynamical equations and the case becomes unique, when supersonic and subsonic flows can be considered separately. The equations of gas dynamics are

$$v_j \frac{\partial v_i}{\partial x_j} + \frac{1}{\rho}\frac{\partial p}{\partial x_i} = 0, \qquad \frac{\partial \rho v_j}{\partial x_j} = 0, \qquad v_j \frac{\partial s}{\partial x_j} = 0 \qquad (1)$$

$$p = p(\rho, s)$$

where v_i, p, ρ, s are components of stream velocity, pressure, density and entropy respectively at the point x_i. (i, j = 1, 2, 3). Equations of $C_{\pm}$ - characteristic surfaces $x_3 = x_3(x_1, x_2)$ of Eq. (1) are

$$v_j n_j \pm a = 0 \qquad (2)$$

where $a = \sqrt{(\partial p/\partial \rho)_s}$ = velocity of sound, and n_j are components of

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the normal to those surfaces, for which

$$n_1 = \frac{1}{k}\frac{\partial x_3}{\partial x_1}, \quad n_2 = \frac{1}{k}\frac{\partial x_3}{\partial x_2}, \quad n_3 = -\frac{1}{k}$$
$$k = \sqrt{1 + \left(\frac{\partial x_3}{\partial x_1}\right)^2 + \left(\frac{\partial x_3}{\partial x_2}\right)^2} \qquad (3)$$

is valid. Then Eq. (1) becomes

$$(v_i \pm a n_i)\frac{\partial p}{\partial x_i} + a\rho\,(a\delta_{ij} \pm n_i v_j)\frac{\partial v_i}{\partial x_j} = 0 \qquad (4)$$
$$(\delta_{ij} = 1 \text{ при } i = j \text{ и } \delta_{ij} = 0 \text{ при } i \neq j)$$

If $C_{\pm}$ coincides with the sonic surface, then it follows from Eq. (2) that it is orthogonal at all points to the streamlines through those points, and the component of velocity vector tangential to the surface is

$$v_j = \mp a n_j \qquad (5)$$

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$$\frac{\partial}{\partial x_1}\frac{\partial x_3/\partial x_1}{\sqrt{1+(\partial x_3/\partial x_1)^2+(\partial x_3/\partial x_2)^2}}+\frac{\partial}{\partial x_2}\frac{\partial x_3/\partial x_2}{\sqrt{1+(\partial x_3/\partial x_1)^2+(\partial x_3/\partial x_2)^2}}=0 \qquad (6)$$

is obtained as the equation of minimal surfaces. (6) is closely related to the analytical functions of complex variable; its theory is well known. The above result is expressed in the Theorem. If a closed contour encloses the sonic transition surface which coincides with the characteristic surface of gas dynamical equations, then this surface will have a minimum area and velocity vector at any point on it, and will be orthogonal to this surface. An example is given as an illustration. There are 1 figure and 8 references: 6 Soviet-bloc and 2 non-Soviet-bloc.

SUBMITTED: February 13, 196[illegible]

Card 4/

KATSKOVA, Ol'ga Nikiforovna; SHMYGLEVSKIY, Yuriy Dmitriyevich; DITKIN, V.A., prof., otv. red.; KOVAL'SKAYA, I.F., tekhn. red.

[Tables of the parameters of axially symmetric supersonic flow of a freely expanding gas with a plane transition surface]Tablitsy parametrov osesimmetrichnogo sverkhzvukovogo techeniia svobodno rasshiriaiushchegosia gaza s ploskoi perekhodnoi poverkhnost'iu. Moskva, Izd-vo Akad. nauk SSSR, 1962. 363 p. (MIRA 15:9)
(Supersonic nozzles) (Aerodynamics--Tables, etc.)

S/040/62/026/001/013/023
D237/D304

26.2160

AUTHOR: Shmyglevskiy, Yu. D. (Moscow)

TITLE: Variational problems for supersonic bodies of revolution and nozzles

PERIODICAL: Akademiya nauk SSSR. Otdeleniye tekhnicheskikh nauk. Prikladnaya matematika i mekhanika, v. 26, no. 1, 1962, 110-125

TEXT: A continuation of the work of L. Ye. Sternin (Ref. 8: Dokl. AN SSSR, 1961, v. 139, no. 2, 335-336). The author presents the results of further investigations of variational problems for axially-symmetrical supersonic flows. A variational method is used to determine the characteristic ensuring a minimum wave resistance of the body of revolution and the sufficient conditions are derived. Discontinuous solutions are constructed for the regions, within which the minimum cannot be reached along the continuous functions, and the region of isentropic flows is singled out. The results obtained are illustrated graphically. An example illustrating the method is worked out, and the paper is concluded with a short discussion on optimal Laval nozzles, i.e. nozzles which in a given flow have a

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maximum thrust. The problem is shown to be identical to that of the inner streamlining of a body of revolution and the formulas derived above can be used, but with the characteristics interchanged. The author thanks O.S. Ryzhov for useful criticism, A.N. Belova for performing the calculations and L.V. Papandina for graphical work. There are 10 figures and 12 references: 8 Soviet-bloc and 4 non-Soviet-bloc. The references to the English-language publications read as follows: G.V.R.Rao, Jet Propulsion, 1958, v. 28, no. 6, 377-382; G. Guderley, Zeitschrift für Flugwissenschaften, December 1959, H. 12, 7, 345-350; R.W. Fanselau, Journ. ARS, 1959, v. 29, no. 6, 456-457.

SUBMITTED: July 18, 1961

PHASE I BOOK EXPLOITATION SOV/6518

Shmyglevskiy, Yu. D.

Nekotoryye variatsionnyye zadachi gazovoy dinamiki (Some Variational Problems of Gas Dynamics). Moscow, VTs AN SSSR, 1963. 141 p. (Series: Akademiya nauk SSSR. Vychislitel'nyy tsentr. Trudy) Errata printed on inside of back cover. 26000 copies printed.

Sponsoring Agency: Akademiya nauk SSSR.

Resp. Ed.: O. S. Ryzhov; Ed.: I. A. Orlova; Tech. Ed.: N. S. Popova.

PURPOSE: This book is intended for scientific personnel engaged in the study of gas dynamics and aeronautics.

COVERAGE: This book presents the results of previous investigations and some new solutions of variational problems of gas dynamics. Personalities mentioned: D. E. Okhotsimskiy, A. A. Dorodnitsyn, L. S. Sternin, O. M. Belotserkovskiy, P. I. Chushkin, O. S. Ryzhov, A. N. Krayko, M. K. Kerimov, I. N. Naumova, L. V. Papandina, and A. N. Belova. There are 25 references, 19 Soviet and 6 non-Soviet.

Card 1/4

S/040/63/027/001/025/027
D251/D308

AUTHORS: Borisov, V.M. and Shmyglevskiy, Yu.D. (Moscow)

TITLE: On the set-up of variation problems of gas dynamics

PERIODICAL: Prikladnaya matematika i mekhanika, v. 27, no. 1, 1963, 183-185

TEXT: The author considers a two-dimensional iso-energetic and isentropic flow expressed as a contour integral. The set-up of variation problems for such a flow are given. Two methods of dealing with the problem of maximum nozzle thrust and one general variation problem are given. There is 1 figure.

SUBMITTED: October 10, 1962

Card 1/1

NAUMOVA, I.N.; SHMYGLEVSKIY, Yu.D., otv. red.; ORLOVA, I.A., red.

[Method of characteristics for the equilibrium flow of a nonideal gas] Metod kharakteristik dlia ravnovesnykh techenii neideal'nogo gaza. Moskva, Vychislitel'nyi tsentr AN SSSR, 1964. 43 p. (MIRA 18:2)

KATSKOVA, T.N.; SEMYONOVSKIY, Yu.L., otv. red.; GRLOVA, I.A., red.

[Calculation of equilibrium gas flow in supersonic nozzles] Raschet ravnovesnykh techenii gaza v sverkhzvukovykh soplakh. Moskva, Vychislitel'nyi tsentr AN SSSR, 1964. 59 p. (MIRA 18:2)

SHMYGLEVSKY, YU.D. (Moscow)

"Some variational problems of gas dynamics".

report presented at the 2nd All-Union Congress on Theoretical and Applied Mechanics, Moscow, 29 January - 5 February 1964

ACCESSION NR: AP4022657 S/0207/64/000/001/0109/0113

AUTHORS: Pavlova, L. M. (Moscow); Shmy*glevskiy, Yu. D. (Moscow)

TITLE: Boundary layer in radiating gas

SOURCE: Zhurnal priklad. mekhan. i tekhn. fiz., no. 1, 1964, 109-113

TOPIC TAGS: boundary layer, radiating gas, plane flow, axisymmetric flow, wing, body of rotation, thermodynamic equilibrium, radiant energy, Navier Stokes equation, approximation, numerical computation, Mach number

ABSTRACT: The authors study plane and axisymmetric flow of radiating gas in the boundary layer of plane surfaces. Such surfaces bound, for example, a wing with a rhombiform profile and the plane front part of a body of rotation. Simplified equations proposed by other authors which facilitate computation are studied. The authors obtain an inequality for which such simplification is permissible, and they derive conditions determining the possibility of using this simplification. Error not exceeding that in equations of the boundary layer in comparison with the Navier-Stokes equations is considered permissible in computing the flow of

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ACCESSION NR: AP4022657

radiant energy. The wall temperature is assumed to coincide with the gas temperature when the axis y = 0. Such coincidence occurs in the case of a sublimating surface. The authors do some numerical computations for specific cases, which are presented in a table. Orig. art. has: 1 figure, 1 table, and 22 formulas.

ASSOCIATION: none

SUBMITTED: 24Oct63 DATE ACQ: 08Apr64 ENCL: 00

SUB CODE: AI NO REF SOV: 006 OTHER: 002

Card 2/2

SHMYGLEVSKIY, Yu.D. (Moscow)

Some variation problems of gas dynamics. Archiw mech 16 no.3: 557-569 '64.

1. Computer Center of the Academy of Sciences of the U.S.S.R.

L 10801-65 EWT(1)/EWP(m)/FCS(k)/EWA(1) Pd-4
ACCESSION NR: AP4013392 S/0040/64/028/001/0178/0182

AUTHORS: Krayko, A. N. (Moscow); Naumova, I. N. (Moscow); Shmy*glevskiy, Yu. D. (Moscow)

TITLE: Construction of bodies of optimal shape in supersonic flow

SOURCE: Prikladnaya matematika i mekhanika, v. 28, no. 1, 1964, 178-182

TOPIC TAGS: optimal shape, supersonic flow, minimal drag, maximal thrust, axisymmetric jet, Lagrange problem

ABSTRACT: Under certain simplifying assumptions of a nature too detailed to be covered here, the authors determine the regions of existence in the plane of flow of various solutions to the problem of determination of bodies with minimal drag and jets with maximal thrust when certain limitations are placed on the dimensions involved. Working basically with a jet, they also construct new solution schemes. Their solutions contain the part of the boundary extremum brought about by the dimension restriction, which was formerly lost due to the necessity, previously, of using numerical methods. Orig. art. has: 3 figures and 26 formulas.

ASSOCIATION: none

SUBMITTED: 24Oct63 ENCL: 00

SUB CODE: ME NO REF SOV: 006 OTHER: 005

Card 1/1

Shmyglevskiy, Yu. D.

L 50193-65 EWT(d)/EWT(l)/EWP(m)/EWT(m)/EWP(w)/EWG(s)-2/EWG(v)/EWA(d)/EWP(v)/EPR/T-2/EWP(k)/EPA(bb)-2/FCS(k)/EWA(h)/EWA(l) Pd-1/Pe-5/Pf-4/Ps-4/Peb/Pw-4

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Katskova, O. N.

Calculation of equilibrium gas flow in supersonic nozzles (Raschet ravnonesnykh techeniy gaza v sverkhzvukovykh soplakh) Moscow, VTs AN SSSR, 1964. 59 p. illus., biblio. 1850 copies printed.

Series note: Akademiya nauk SSSR. Vychislitel'nyy tsentr. Trudy

TOPIC TAGS: equilibrium gas flow, supersonic nozzle, annular nozzle, nozzle design

PURPOSE: This book is intended for technical personnel concerned with design and operation of nozzles.

COVERAGE: The procedure and formulas for calculating of gas flow parameters in plane and axisymmetric nozzles are presented. Steady equilibrium flows of an imperfect gas with arbitrary thermodynamic characteristics are examined. Equations are given for a particular case of an adiabatic flow of a perfect gas. Gas flows in nozzles with plane nozzles and with a break in the generatrix at the

Card 1/4

discharge section, as well as in annular nozzles are examined. The method of characteristics properly adapted for the computation on electronic computers is utilized. The author thanks Yu. D. Shmyglevskiy, A. N. Krayko, and O. S. Ryzhov, for their advice and comments. There are 41 references: 27 Soviet, 12 English, and 2 German.

TABLE OF CONTENTS:

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AVAILABLE: Library of Congress

SUB CODE: ME SUBMITTED: 20Oct64 NO REF SOV: 027

OTHER: 014

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L 08113-67 EWP(m)/EWT(1) WW

ACC NR: AP6034544 SOURCE CODE: UR/0421/66/000/005/0102/0104

53
B

AUTHOR: Shmyglevskiy, Yu. D. (Moscow)

ORG: none

TITLE: Minimum drag of the aft sections of bodies

SOURCE: AN SSSR. Izvestiya. Mekhanika zhidkosti i gaza, no. 5, 1966, 102-104

TOPIC TAGS: supersonic aerodynamics, supersonic flow, ~~drag~~ perfect gas, plane flow, axisymmetric flow, drag coefficient

ABSTRACT: The problem of minimum wave drag of the aft section of bodies of a given profile is considered. A system of equations describing the flow of a perfect gas past a body of revolution when the free flow is given on the Mach line ah (see Fig. 1).

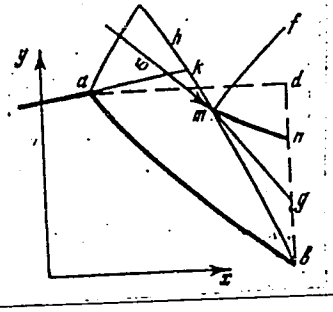

Fig. 1. Body and flow configurations

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The line ahdba is chosen as a control contour, the segment hd is the Mach line of a second family, and bd is determined by conditions: $x = x_b$, $y_b \leq y \leq y_a$. The variational problem on the control contour is formulated and solved in the conventional way. The problem consists in finding the functions $\alpha(y)$ and $\theta(y)$ on hd, where α is the Mach angle and θ is the angle between velocity vector and x axis, and functions $u(y)$ and $v(y)$ on hd which minimize the drag χ given by the formula

$$\frac{\chi}{(2\pi)^\nu} = \int_{y_a}^{y_h} F_1 dy + \int_{y_d}^{y_h} \Phi_1 dy + \int_{y_b}^{y_d} \Psi_1 dy.$$

Results of numerical calculations of the minimum drag coefficient are given in tabular form as an illustrative example. Orig. art. has: 2 figures.

SUB CODE: 20/ SUBM DATE: 14Jun66/ ORIG REF: 001/ ATD PRESS: 5103

Card 2/2 LS

MARDERER, R.G.; SHMYGLINA, A.I.; SOROKINA, S.S.

Some data on the epidemiological effectiveness of antipoliomyelitis vaccinations. Vop.virus. 7 no.6:740 N-D '62.
(MIRA 16:4)

1. Nauchno-issledovatel'skiy institut epidemiologii, mikrobiologii i gigiyeny, Kuybyshev.
(POLIOMYELITIS--VACCINATION)

25(2) SOV/66-59-5-4/35

AUTHORS: Chaykovskiy, V., Candidate of Technical Sciences, Shmyglya, A., Engineer, Savkov, K., Engineer

TITLE: Comparative Tests of Valves of Various Designs

PERIODICAL: Kholodil'naya tekhnika, 1959, Nr 5, pp 17-21 (USSR)

ABSTRACT: In order to evaluate the serviceableness of valves of various makes and designs, as used in Freon machines, a series of comparative tests have been conducted in the laboratory of the Odessa Refrigeration Machine Building Plant im.Stalin. The valves were divided in 4 groups: The 1st and 2nd groups comprised various types of the suction and discharge valves. The 3rd group contained valves manufactured by the Austrian firm Hörbiger and the 4th group valves designed by Engineer A. Shmyglya. The characteristics of the 4 types of valves are shown in Table 1. The tests were conducted with compressor 2FV-10 at certain fixed initial and final temperatures, -15°C and 30°C. A timing device recorded the time necessary for bringing the pressure in the receiver from 0 to 5 atmospheres. The best time - 22.5 seconds - was made by group 4 valves. Table 2 shows the results of comparative tests obtained by the 4 groups at temperatures indicated. The highest volumetric and energy coefficients of the compressor 2FV-10 were obtained with valves

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Comparative Tests of Valves of Various Designs

of group 4 with reduced dead space. The discharge coefficient of the Freon compressor falls sharply with the increase of dead space starting from 3.5% for example. The reduction of dead space in Freon compressors of average output to below 2% holds practically no advantage.
There are 4 photos, 2 tables and 1 graph.

ASSOCIATION: Odesskiy tekhnologicheskiy institut pishchevoy i kholodil'noy promyshlennosti (Odessa Technological Institute of the Food and Refrigeration Industries) (Chaykovskiy, V.), Odesskiy zavod kholodil'nogo mashinostroyeniya imeni Stalina (Odessa Refrigeration Machine Building Plant im. Stalin) (Shmyglya, A. and Savkov, K.)

SHMYGLYA, A.A.; VODYANITSKAYA, N.I.

Experimental study of the motion of the plates of compressor valves. Khol. tekh. 42 no.4:14-18 Jl-Ag '65. (MIRA 18:9)

1. Odesskiy tekhnologicheskiy institut pishchevoy i kholodil'noy promyshlennosti.

FILIPPOV, P., inzh.; SHMYGLYA, A., inzh.

Making bimetallic tube grids for condensers. Khol. tekh. 34 no.4: 34-36 O-D '57. (MIRA 11:1)
(Condensers (Vapors and gases))

MARTYNOVSKIY, V.; CHAYKOVSKIY, V.; SHMYGLYA, A.

Methods of testing piston-type refrigeration compressors. Khol.tekh. 37 no.3:61-63 My-Je '60. (MIRA 13:7)
(Air compressors)

CHAYKOVSKIY, V.F., kand.tekhn.nauk, dotsent; SHMYGLYA, A.A., inzh.; VODYANITSKAYA, N.I., inzh.

Values of the mean temperature of the walls of a Freon uniflow compressor. Trudy OTIPiKhP 12:33-36 '62. (MIRA 17:1)

1. Kafedra kholodil'nykh mashin Odesskogo tekhnologicheskogo instituta pishchevoy i kholodil'noy promyshlennosti.

CHAYKOVSKIY, V.F., kand. tekhn. nauk; SHMYGLYA, A.A., inzh.;
VODYANITSKAYA, N.I., inzh.

Methods for recording the changes in pressure during compressor testing. Khol. tekh. 39 no.5:11-15 S-O '62. (MIRA 16:7)

1. Odesskiy tekhnologicheskiy institut pishchevoy i kholodil'noy promyshlennosti.
(Compressors—Testing)

Shmyglya, P. T.

1975. Shmyglya, P. T., The leakage of a liquid through penetrable layers to the roof and to the floor, in the case of rectangular and radial filtration (in Russian), *Trudi Mosk. neft. Inst.* no. 14, 230–241, 1955; Rev. no. 315, *Ref. Zh. Mekh.* 1956.

The problem is examined of filtration in a seam of large dimensions in plan, during leakage from it into adjacent seams which are separated from it by thin, feebly penetrable layers. For solving this problem, on the assumption of the constancy of the potential along the verticals, use was made of methods developed by A. N. Myatiev, *Izv. Akad. Nauk SSSR Otd. tekh. Nauk* no. 9, 1947. Equations are given for rectilinear and axially symmetrical motion of a liquid. For the first case, an approximate solution is compared as an example with the available precise solution of V. N. Shchelkachev and M. A. Gusein-Zade. An accurate solution for the second case, that of radial filtration, is given in M. A. Gusein-Zade's work. Author discusses the calculation of certain forced and operational wells in an unlimited stratum, and gives an example.

G. K. Mikhailov, USSR

Courtesy of Referativnyi Zhurnal
Translation, courtesy Ministry of Supply, England

124-57-1-798 D

Translation from: Referativnyy zhurnal, Mekhanika, 1957, Nr 1, p 106 (USSR)

AUTHOR: Shmyglya, P.T.

TITLE: Experimental and Theoretical Investigation of the Convergence Flow Toward Shallow Wells in Linear and Nonlinear Filtration Conditions (Eksperimental'noye i teoreticheskoye issledovaniya pritoka k nesovershennym skvazhinam pri lineynom i nelineyom zakonakh fil'tratsii)

ABSTRACT: Bibliographic entry on the author's dissertation for the degree of Candidate of Technical Sciences, presented to the Mosk. neft. in-t (Moscow Petroleum Institute), Moscow, 1956.

ASSOCIATION: Mosk. neft. in-t (Moscow Petroleum Institute), Moscow

1. Petroleum--Hydrodynamic characteristics--Bibliography
2. Oil wells--Performance

Card 1/1

SHMYGLYA, P.T.

Nonlinear fluid flow toward imperfect wells. Trudy VNII no.17: 148-152 '58. (MIRA 12:1)
(Hydraulics)

SHMYGLYA, P.T.

Flow toward the perforated channel in binomial law of flow.
Trudy KF VNII no.2:124-129 '59. (MIRA 13:11)
(Oil reservoir engineering)

SHMYGLYA, P.T.

Flow toward wells equipped with slotted liners. Trudy KF VNII no.2:130-138 '59. (MIRA 13:11)
(Filters and filtration)

SHMYGLIA, P.T.; BASHIYEV, K.S.

Certain particular aspects of the elaboration of experimental data of gas wells. Gaz. prom. 4 no.12:7-9 D '59.
(MIRA 13:3)

(Gas wells)

SHMYGLYA, P.T.; BASNIYEV, K.S.

Practice of commercial exploitation of the Anastasiyevskoye-Troitskoye gas field. Trudy KF VNII no.5:31-38 '61. (MIRA 14:10)
(Kuban--Gas, Natural)

SHMYGLYA, P.T.

Certain problems involved in the development of gas pools of the Radchenkova field. Gaz. prom. 6 no.3:1-4 '61. (MIRA 14:3)
(Poltava Province—Gas wells)

SHMYGLYA, P.T.

Determining gas yield from a group of gas fields. Trudy KF VNII no.9:98-101 '62. (MIRA 15:9)
(Gas, Natural)

SHEYGLYA, Petr Terent'yevich; BRAGIN, Viktor Alekseyevich; DINKOV, Vasiliy Aleksandrovich; ARUTYUNOV, A.I., red.; CHOPOROVA, T.A., ved. red.; STAROSTINA, L.D., tekhn.red.

[Programming the development and exploitation of gas condensate wells. Gas condensate wells in Krasnodar Territory] Proektirovanie razrabotki i ekspluatatsiia gazokondensatnykh mestorozhdenii; gazokondensatnye mestorozhdeniia Krasnodarskogo kraia. Moskva, Gostoptekhizdat, 1963. 233 p. (MIRA 17:1)

SHMIGLIA, P.T.

Determining the operating conditions of gas wells in the development of gas and gas condensate fields with bottom water. Trudy KF VNII no.11:104-107 '63. (MIRA 17:3)

SHMYGLYA, P.T.; VASIL'YEVA, L.I.; MOKRISHCHEV, E.P.; RASSOKHIN, G.V.

Present status of the development of gas-condensate fields in Krasnodar Territory. Gaz. delo no.6/7:16-27 '63.
(MIRA 17:10)

1. Krasnodarskiy filial Vsesoyuznogo neftegazovogo nauchno-issledovatel'skogo instituta.

FILIMONOVA, T.N.; SHMYGOV, A.M.

A 15 Mev. linear electron accelerator. Zhur. tekh. fiz. 32 no.12:1438-1445 D '62. (MIRA 16:2)
(Particle accelerators)

IGNATOK, A.I., red.; LABUTIN. V.P., red.; IVANOV, I.Z., strashyy inzh.po tekhnike bezopasnosti, red.; GANUSHKINA, Ye.V., kand. tekhn. nauk, red.; PLAKHIN, A.S., kand. med. nauk, starshyy nauchnyy sotr., red.; SHMYGOVA, K.N., red.; FESEL', M.I., starshyy tekhnolog, red.; ALEKSEYEV, A.I., red.; DOBRITSYNA, R.I., tekhn. red.

[Safety and sanitation regulations for electroplating shops] Pravila tekhniki bezopasnosti i proizvodstvennoi sanitarii pri proizvodstve metallopokrytii. Moskva, Gos. nauchno-tekhn. izd-vo mashinostroit. lit-ry, 1961. 30 p. (MIRA 14:8)

1. Profsoyuz rabochikh mashinostroyeniya SSSR. 2. Glavnyy tekhnicheskiy inspektor TSentral'nogo komiteta profsoyuza rabochikh mashinostroyeniya SSSR (for Ignatok). 3. Nachal'nik laboratorii metallopokrytiy Nauchno-issledovatel'skogo instituta tekhnologii avtomobil'noy promyshlennosti (for Labutin). 4. Nauchno-issledovatel'skiy institut tekhnologii avtomobil'noy promyshlennosti (for Ivanov). 5. Nachal'nik laboratorii metallopokrytiy Nauchno-issledovatel'skogo instituta tekhnologii traktornogo i sel'skokhozyaystvennogo mashinostroyeniya (for Ganushkina). 6. Moskovskiy nauchno-issledovatel'skiy institut okhrany truda Vsesoyuznogo tsentral'nogo soveta profsoyuzov (for Plakhin). 7. Moskovskiy zavod malolitrazhnykh avtomobiley (for Fesel'). 8. Glavnyy konstruktor Gosudarstvennogo instituta po proyektirovaniyu zavodov avtomobil'noy promyshlennosti (for Alekseyev).
(Electroplating--Safety measures) (Factory sanitation)

AKSMAN, N.M.; VILENSKIY, L.I.; GORBUNOV, N.G.; GUBSKIY, V.N.; GURVICH, M.D.; LATYSHEV, Yu.M.; LEVONTIN, L.I.; LIVSHITS, T.G.; LOGINOVA, M.K.; LUR'YE, D.A.; LYANDRES, G.D.; MIROSHNICHENKO, G.K.; MOGILEVSKIY, B.Ya.; NEMKOVSKIY, M.I.; ORLEANSKIY, Ya.P.; SAVITSKIY, A.N.; SIMMA, S.F.; SURKOV, G.Z.; SHMYGUL', B.P.; SHUBIN, V.P.; DONSKOY, Ye.Ye., red.izd-va; KAL'NITSKIY, R.Ya., red.izd-va; ZAMAKHOVSKIY, L.S., tekhn.red.

[Mechanization and automation in the machinery industry] Mekhanizatsiia i avtomatizatsiia v stankostroenii. Khar'kov, Khar'kovskoe obl.izd-vo, 1958. 119 p. (MIRA 13:2)

1. Kharkov. Institut "Giprostanok." 2. Direktor instituta "Giprostanok" (for Orleanskiy).
(Machinery industry--Technological innovations)
(Automation)

PHASE I BOOK EXPLOITATION SOV/4445

Ivanov, N. Kh., B.S. Kalinin, D.A. Lur'ye, L.I. Levontin, G.K. Miroshnichenko, B.F. Shmygul', and N.N. Sherlaimov

Avtomaticheskaya ustanovka dlya proizvodstva CO_2; sbornik rabochikh chertezhey (Automatic Plant for the Production of CO_2; Collection of Working Drawings) Moscow, Mashgiz, 1960. 65 sheets. 3,000 copies printed.

Reviewer: A.A. Gorshkov, Corresponding Member, Academy of Sciences UkrSSR, Doctor of Technical Sciences, Professor; Chief Ed. (Southern Division, Mashgiz): V.K. Serdyuk, Engineer; Ed. (Inside book): M.S. Soroka; Ed. (Title page): Ya. P. Orlesnskiy.

PURPOSE: This book is intended for technical personnel in foundry shops.

COVERAGE: The book contains 65 drawings of an automatic installation for the production of carbon dioxide. A brief description is also given of basic methods of CO_2 production for general industrial uses and for the food industry.

The installation was exhibited at the All-Union Industrial Exposition in 1958. No personalities are mentioned. There are no references.

TABLE OF CONTENTS: None given. The book is divided as follows:

Card 1/2

L 8945-66 EWT(m)/EWA(d)/EWP(j)/T/EWP(t)/EWP(b)/EWA(c) RPL JD/JW/WB/RM

ACC NR: AP5026518 SOURCE CODE: UR/0286/65/000/019/0049/0049

AUTHORS: Gershenovich, A. I.; Stefanovich, V. V.; Mil'rud, S. S.; Khodkina, V. Ye.; Shaygul', V. G.; Vydrova, Ye. A.

ORG: none

TITLE: Method for obtaining surface-active quaternary ammonium compounds. Class 23, No. 175163 [announced by Organization of State Committee for Chemical Industry at the Gosplan SSSR (Organizatsiya gosudarstvennogo komiteta khimicheskoy promyshlennosti pri gosplane SSSR)]

SOURCE: Byulleten' izobreteniy i tovarnykh znakov, no. 19, 1965, 49

TOPIC TAGS: surface active agent, ammonium compound, polymer, polymerization

ABSTRACT: This Author Certificate presents a method for obtaining surface-active quaternary ammonium compounds by chloromethylating aromatic hydrocarbons, followed by condensation of the chloromethylated product with pyridue or its homologues or with tertiary aliphatic amines. To simplify the process, chloromethylation is carried out in a hydrochloric acid medium and the condensation in an aqueous medium.

SUB CODE: 07/ SUBM DATE: 08Sep64

Card 1/1 pw UDC: 661.185—322.3

1. SIMYNIN, V. N.

2. USSR (600)

4. Dahlias

7. Storing dahlia tubers. Biul. Glav. bot. sada no. 13, 1952.

9. Monthly List of Russian Accessions, Library of Congress, March 1953. Unclassified.

SHMYGUN, V.N.

New varieties of dahlia. Biul.Glav.bot.sada no.14:93-95 '52. (MLRA 6:5)

1. Glavnyy botanicheskiy sad Akademii Nauk SSSR. (Dahlias)

SHMYGUN, V.N.

Dahlia breeding. Biul.Glav.bot. sada no.17:106-109 '54. (MLRA 8:3)

1. Glavnyy botanicheskiy sad Akademii nauk SSSR.
(Dahlias)

SHMYGUN, V.N.

Biology of dahlia flowering. Biul.Glav.bot.sada no.20:118-123 '55.
(MLRA 8:9)

1. Glavnyy botanicheskiy sad Akademii nauk SSSR. (Dahlias)

SHMYGUN, V.N., nauchnyy sotrudnik.

Are house plants harmful to man? Priroda 49 no.8:124 Ag '60.
(MIRA 13:8)

1. Glavnyy botanicheskiy sad AN SSSR.
(House plants)

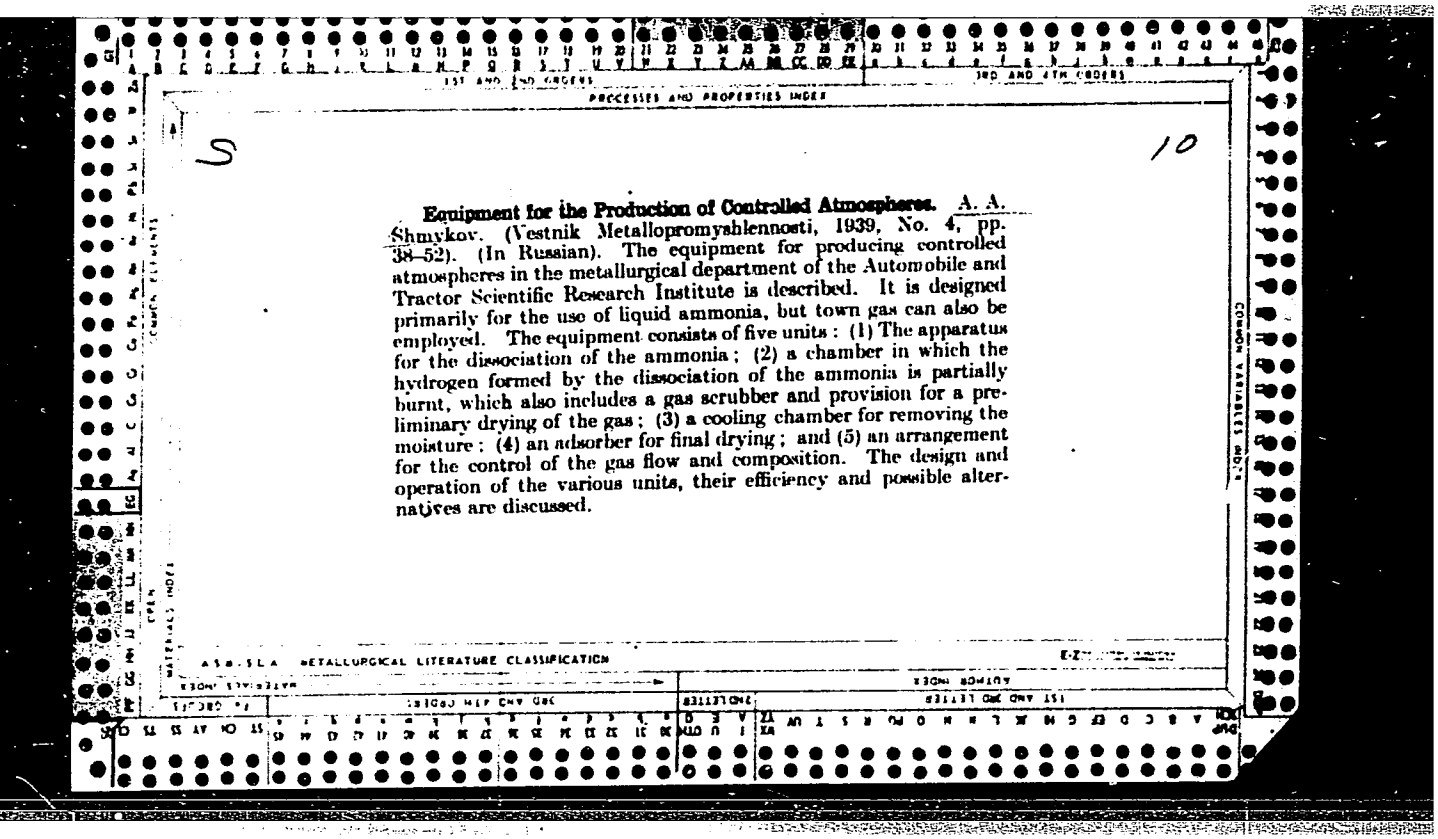
SHMYGUN, V.N., kand.biol.nauk

Plants in the room. Zdorov'e 7 no.3:30-31 Mr '61. (MIRA 14:3)
(PLANTS AS SANITARY AGENTS)

SHMYGUN, V.N.

Indian chrysanthemums in the Main Botanical Garden.
Biul.Glav.bot.sada no.58:61-65 '65.
(MIRA 18:12)

1. Glavnyy botanicheskiy sad AN SSSR.



PROCESSES AND PROPERTIES INDEX

S

10

Equipment for the Production of Controlled Atmospheres. A. A. Shmykov. (Vestnik Metallopromyshlennosti, 1939, No. 4, pp. 38–52). (In Russian). The equipment for producing controlled atmospheres in the metallurgical department of the Automobile and Tractor Scientific Research Institute is described. It is designed primarily for the use of liquid ammonia, but town gas can also be employed. The equipment consists of five units: (1) The apparatus for the dissociation of the ammonia; (2) a chamber in which the hydrogen formed by the dissociation of the ammonia is partially burnt, which also includes a gas scrubber and provision for a preliminary drying of the gas; (3) a cooling chamber for removing the moisture: (4) an adsorber for final drying; and (5) an arrangement for the control of the gas flow and composition. The design and operation of the various units, their efficiency and possible alternatives are discussed.

A.S.M.-S.L.A. METALLURGICAL LITERATURE CLASSIFICATION

C A

9

Methods for the production of a controlled atmosphere from natural gas. A. A. Shmykov. *Vestnik Mashinostroeniya* 27, No. 8, 57-60(1947); *Chem. Zentr.* 1948, I, 125. When an atm. of natural gas is used for various processes of metal working, as annealing, cementation, or cyaniding, the very high temps. often cause a dissocn. with the formation of sooty hydrocarbons. Various processes for preventing this by producing an atm. from the natural gas which will remain const. are reviewed. They usually depend in principle on a breakdown of the gases by the addn. of air, steam, or CO_2. Schematic diagrams of app. are given and their use is explained.

M. G. Moore

Heat treatment of metals; reports. Moskva, Gos. nauch.-tekhn. izd-vo mashinostroit. lit-ry, 1948. 302 p. (50-15027)

TK731.M6

SHMYKOV, A.A.

[Metallurgist's handbook] Spravochnik termista. Izd.2.,ispr. i dop. Moskva, Gos. nauchno-tekhn. izd-vo mashinostroit. lit-ry, 1952. 287 p. (MLRA 6:5)
(Metallurgy--Handbooks, manuals, etc.)

SHMYKOV, A.A.; MALYSHEV, B.V.

[Controlled atmosphere in the heat-treatment of steel] Kontroliruemye atmosfery pri termicheskoi obrabotke stali. Moskva, Gos.nauchno-tekhn. izd-vo mashinostroit.lit-ry, 1953. 371 p. (MLRA 6:12)
(Steel--Heat treatment)

Name: SHMYKOV, Aleksey Andreyevich

Dissertation: Theoretical bases of acidless heating of steel

Degree: Doc Tech Sci

Affiliation: All-Union Correspondence Machine Building Inst

Defense Date, Place: 13 Dec 56, Council of Moscow Order of Labor Red Banner Inst of Steel imeni Stalin

Certification Date: 29 Jun 57

Source: BMVO 18/57

SHMYKOV, Aleksey Andreyevich, kandidat tekhnicheskikh nauk; GLINER, B.M., inzhener, redaktor; POPOVA,S.M., tekhnicheskiy redaktor

[Metallurgist's handbook] Spravochnik termista. Izd. 3-e, ispr. i dop. Moskva, Gos. nauchno-tekhn. izd-vo mashinostroit. lit-ry, 1956. 331 p. (MLRA 10:1)
(Metallurgy--Handbooks, manuals, etc.)

Shmykov, A.A

137-1958-2-2725

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 2, p 75 (USSR)

AUTHOR: Shmykov, A.A.

TITLE: Theoretical Considerations in Selecting the Make-up of the Gaseous Atmosphere in the Sintering of Powdered Metals (Teoreticheskiye osnovy vybora sostava gazovykh atmosfer pri spekanii metallicheskikh poroshkov)

PERIODICAL: V sb.: Poroshkovaya metallurgiya. Nr. 4, Moscow, 1956, pp 32-42

ABSTRACT: Attention is given to the selection of a reducing gaseous atmosphere for the sintering of the porous pressed compacts of the powdered metals Fe, Fe+C, Fe+Ni, Fe+Cr, and of powdered alloyed steel and other powdered alloys. The course of the oxidizing and reducing reactions occurring on the surface of the metal particles was analyzed, also the thermodynamic conditions of equilibrium of gas-metal systems with atmospheres of the types $H_2 - H_2O - N_2$, $CO - CO_2 - N_2$, and $CO - CO_2 - H_2 - H_2O - N_2$. Included are equilibrium diagrams for the systems $H_2 - H_2O$ - Me - MeO and $CO - CO_2$ - Me - MeO at 400-1400°, also equilibrium

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137-1958-2-2725

Theoretical Considerations in Selecting the Make-up of the Gaseous (cont.)

diagrams for the atmosphere $H_2 - H_2O$ with a chrome steel at $600 - 1400^{\circ}$.

I.B.

1. Powder alloys--Sintering 2. Gases--Atmospheric conditions --Determination

Card 2/2

Shmykov, A.A.

137-1958-2-2726

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 2, p 75 (USSR)

AUTHORS. Shmykov, A.A., Sarvina, A.S.

TITLE. The Effect of Hydrogen Moisture on the Decarbonization of Iron-graphite Products (Vliyaniye vlazhnosti vodoroda na obezuglerozhivaniye zhelezografitovykh izdeliy)

PERIODICAL: V sb.: Poroshkovaya metallurgiya. Nr. 4, Moscow, 1956, pp 48-58

ABSTRACT: Experimental investigations were made of the effect of the temperature (in the 800-1200° range) and duration of sintering in an H_2 atmosphere with varying moisture (at a gas consumption rate of a liter per minute) and of the initial porosity of the pressed compacts on the decarbonization of Fe-graphite products. It was shown that the capacity of the H_2 for decarbonization decreased with the decline of its moisture content but that it did not drop to zero even when the dew point was $-60°$. It is recommended that sintering be done with minimum moisture in the gas and maximum density of the pressed compact.

I.B.

Card 1/1

1. Iron graphite--Sintering 2. Iron graphite--Temperature effects

SOKOLOV, Konstantin Nikandrovich; SHMYKOV, A.A., doktor tekhn.nauk, retsenzent; RUSTEM, S.L., kand.tekhn.nauk, retsenzent; SAMOSHIN, I.G., kand.tekhn. nauk, retsenzent; ARZAMASOV, B.N., kand.tekhn.nauk, retsenzent; LAPKIN, N.I., kand.tekhn.nauk, red.; DUGINA, N.A., tekhn.red.

[Equipment of heat-treating shops] Oborudovanie termicheskikh tsekhov. Moskva, Gos. nauchno-tekhn. izd-vo mashinostroit. lit-ry, 1957. 420 p. (MIRA 11:4)

1. Kafedra termicheskoy obrabotki metallov Moskovskogo vysshego tekhnicheskogo uchilshcha im. Baumana (for Samoshin, Arzamasov)
(Metals--Heat treatment)

ASSONOV, Aleksandr Danilovich,; SHEPELYAKOVSKIY, Konstantin Zakharovich,; LANKIN, Petr Aleksandrovich,; YAITSKOV, S.A., inzh.; SHKLYAROV, I.N., inzh.; RABIN, M.O., inzh.; SKNYUSHKIN, N.V.; ZHIVOTOVSKIY, A.N.; BORISOV, N.I.; SHMYKOV, A.A., doktor tekhn. nauk, red.; LOZINSKIY, M.G., doktor tekhn.nauk, retsenzent,; MODEL', B.I., tekhn.red.

[Gas cementation with induction heating] Gazovaia tsementatsiia s induktsionnym nagrevom. Moskva, Gos. nauchno-tekhn. izd-vo mashinostroit. lit-ry, 1958. 87 p. (MIRA 11:12)
(Cementation(Metallurgy))

SHMYKOV, A.A.

PHASE I BOOK EXPLOITATION SOV/1558

Moscow. Dom nauchno-tekhnicheskoy propagandy im. F.E. Dzerzhinskogo

Sovremennyye splavy i ikh termicheskaya obrabotka (Contemporary Alloys and Their Heat Treatment) Moscow, Mashgiz, 1958. 329 p. 12,000 copies printed.

Additional Sponsoring Agency: Obshchestvo po rasprostraneniyu politicheskikh i nauchnykh znaniy RSFSR.

Ed. (Title page): Yu. A. Geller, Doctor of Technical Sciences; Ed. (Inside book): V.V. Zhevinskiy, Engineer; Tech. Ed.: B.I. Model'; Managing Ed. for Literature on Metal Working and Tool Making: R.D. Beyzel'man, Engineer.

PURPOSE: The book is intended for engineering and technical personnel of heat-treatment shops and test laboratories of machine-building plants.

COVERAGE: This collection of 28 articles, compiled by 33 authors, aims to acquaint the reader with modern practice in the heat treatment of steels. The authors are primarily concerned with the development of various types of structural, tool, and heat-resistant steels and with the use of their alloying elements. Materials-handling equipment is described at some length. The treatment of alloys, particularly those of titanium, also comes within the scope of the collection. The book is thoroughly diagrammed, and a good deal of the material is shown in graphical form. Among the problems dealt with are the minimization of deformations, the introduction of the automatic control of heat-treating equipment, together with fully mechanized tool manufacture, and the optimum proportions of different alloying elements. There are numerous tables and drawings. Bibliographic listings placed at the end of chapters are predominantly Soviet. The articles comprising this collection are reports delivered at a conference held in the Scientific and Technical Propaganda House imeni F.E. Dzerzhinskiy in Moscow.

Contemporary Alloys and Their Heat Treatment SOV/1558

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SOV/137-58-11-22278

Translation from: Referativnyy zhurnal. Metallurgiya, 1958, Nr 11, p 62 (USSR)

AUTHOR: Shmykov, A. A.

TITLE: Gas Atmospheres in Powder Metallurgy (O primenenii gazovykh atmosfer v poroshkovoy metallurgii)

PERIODICAL: V sb.: Materialy Soveshchaniya glavn. metallurgov z-dov i in-tov avtomob. prom-sti. Nr 5. Moscow, 1958, pp 14-18

ABSTRACT: An examination is made of the influence of water vapor in hydrogen atmospheres upon the processes of oxidation and decarburization of sintered materials. The maximum permissible H_2O vapor content is determined in each individual case by the curves of equilibrium between the gas phase and the corresponding metal. In the case of Fe, Cu, W, Ni, and Mo, it is sufficient to dry the H_2 to the dew point (-60 to -65°C), while for Cr and Al, getters are required. Furnace design (degree of gas-tightness) and conditions of operation, are important. Specifically, it is recommended that furnaces not be used immediately after warming up. To eliminate decarburization, it is necessary to add up to 1% methane to the hydrogen medium (natural gas or liquified butane-propane mixtures may

Card 1/2

Gas Atmospheres in Powder Metallurgy

be used instead).

A. N.

SHMYKOV, A. A.

25(1) PHASE I BOOK EXPLOITATION SOV/1586

Tekhnologicheskiy spravochnik po kovke i ob"yemnoy shtampovke (Handbook on Open and Closed Die Forging) Moscow, Mashgiz, 1959. 966 p. 15,000 copies printed.

Ed. (Title page): M.V. Storozhev; Ed. (Inside book): S.B. Kirsanova, Engineer; Ed. of Publishing House: B.M. Oliner, Engineer; Tech. Ed.: T. F. Sokolova; Managing Ed. for Information Literature (Mashgiz): V.I. Krylov, Engineer.

PURPOSE: The handbook is intended for engineers and technicans working in forging and die forming shops and in engineering design bureaus. It may also be used by teachers and students of technical schools.

COVERAGE: The handbook contains information on processes of forging and closed die forming as carried out on various kinds of forging and pressing machinery. Information is given on initial stock, making blanks, quality inspection of forgings and their heat treatment, and on engineering characteristics of basic machinery and mechanization equipment, on die making and on technical-economic indexes and engineering standardization. The authors state that problems of manufacture by forging and press forming which have only been discussed up to now in periodicals and special-~~COVERAGE~~ ized literature are given in this handbook. No personalities are mentioned. There are [illegible] references, all Soviet.

Card 19/24

SHMYKOV, A. A.

"Equilibrium Diagram of the Carbon Monoxide-Hudrogen-Steam-CarbonSystem." (Properties of endothermic atmospheres used as protective or carburizing media).

Paper presented at the All-Union Conference on Heat Treatment and Metal Science held in May 1960, Odessa.

SHMYKOV, A.A.

Equilibrium diagram of the system CO - H_2 - H_2O - C (γ-Fe).
Izv.vys.ucheb.zav.; chern.met. no.5:16-21 '60.
(MIRA 13:6)

1. Vsesoyuznyy zaochnyy mashinostroitel'nyy institut.
(Phase rule and equilibrium)
(Protective atmospheres)

18700

87034
S/129/60/000/012/006/013
E193/E283

AUTHORS: Shmykov, A. A., Doctor of Technical Sciences, Professor and Saklinskiy, V. S., Engineer

TITLE: The Effect of Allotropic Transformations on Sintering of Iron Powder

PERIODICAL: Metallovedeniye i termicheskaya obrabotka metallov, 1960, No. 12, pp. 26-30 and 35-36

TEXT: The phenomenon of shrinkage during sintering of iron powder (carbon content = 0.05%) was studied by dilatometric measurements. The analysis of experimental results showed that the coefficient of linear shrinkage, due to sintering, begins to change at a temperature corresponding to the recrystallization temperature which, in the case of iron, lies between 450 and 500°C. Any shrinkage taking place below 500°C is due only to relative movement of the powder particles during thermal expansion of the compact and due to the decrease of the initial porosity. The rapid increase in the intensity of shrinkage above the recrystallization temperature is associated with the growth of new grains in the individual, plastically deformed, powder particles. This growth affects the particle boundaries by distorting and displacing

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The Effect of Allotropic Transformations on Sintering of Iron Powder

them; the latter effect brings about the formation of new interfaces, reduces the porosity of the compact and initiates the process of sintering. The shrinkage coefficient reaches its maximum value at temperatures at which phase transformations take place (723-900°C in the case of iron). At temperatures above Ac_3, the coefficient of shrinkage attains its minimum value. The results of experiments in which the effect of sintering temperature on bending strength of sintered compacts was studied, show that the effect of temperature becomes noticeable only starting from about 500°C; with the temperature increasing from 723 to 900°C (from Ac_1 to Ac_3), the strength of sintered compact rapidly increases, while sintering at temperatures above 900°C brings about stabilization of the properties of the sintered compact without any significant increase in its strength. The impact strength of sintered compact changes with the sintering temperature, in the same manner. Experiments, in which the effect of the duration of sintering on shrinkage was studied, showed that if sintering is

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The Effect of Allotropic Transformations on Sintering of Iron Powder

carried out at temperatures above Ac3, no advantage is gained by increasing the sintering time above 1 h. Based on the results of the present investigation, the following procedure is recommended for preparation of sintered iron components of increased strength: 1 - compacting; 2 - 1.5 to 2.5 h sintering at 875°C; 3 - pressing, with final shape-forming; 4 - final sintering at 1000 to 1050°C for no longer than 1 h. A. S. Sarvina and V. K. Svetovidov participated in this work. There are 8 figures, 2 tables and 1 Soviet reference.

ASSOCIATION: Vsesoyuznyy zaochnyy mashinostroitel'nyy institut i Nauchno-issledovatel'skiy institut tekhnologii avtomobil'noy promyshlennosti
(All-Union Correspondence Institute of Machine Building and Technological Scientific Research Institute of the Automobile Industry)

Card 3/3

SHEYKOV, Alekseĭ Andreyevich, prof. doktor tekhn. nauk; NIKONOV, V.F., inzh., retsenzent; GIL'DENBERG, M.I., red. izd-va; TIKHONOV, A.Ya., tekhn. red.

[Manual on the heat treatment of metals] Spravochnik termista. Izd.4., ispr. i dop. Moskva, Gos. nauchno-tekhn. izd-vo mashinostroit. lit-ry, 1961. 390 p. (MIRA 14:9)
(Metals—Heat treatment)

KRUPENNIKOV, S.S., dots.; SUKHANOV, V.P., inzh.; SHMYKOV, A.A., inzh.

Manufacture and assembly of the precast reinforced-concrete elements of the bunker trestle of a blastfurnace stock yard. Trudy NII prom. zdan. i soor. no.2:36-56 '61. (MIRA 15:6)
(Precast concrete construction) (Chelyabinsk--Blast furnaces)

26568
S/129/61/000/008/001/015
E071/E380

11710

AUTHOR: Shmykov, A.A., Doctor of Technical Sciences, Professor

TITLE: Theoretical Basis of the Utilisation of the Endo-gas Atmosphere

PERIODICAL: Metallovedeniye i termicheskaya obrabotka metallov, 1961, No. 8, pp. 2 - 8

TEXT: The endo-gas atmosphere based on CO-H_2-H_2O is widely used as a protective atmosphere in heat treatment and as a carburising agent in gas cementation, gas cyaniding and in powder metallurgy. It can be produced either by a partial combustion of hydrocarbons in externally heated generators or by conversion of methane with steam. In the process of oxidation and reduction of oxides the interaction of this atmosphere with steel is controlled by the direction of the reactions:

$$nM + H_2O \rightleftarrows mM_{n/m}O_{1/m} + H_2 \quad (1)$$

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Theoretical Basis .....

and

$$nM + CO_2 \rightleftharpoons mM_{n/m}O_{1/m} + CO \qquad (2) .$$

Since the H_2O and CO_2 contents are small, the endo-gas atmosphere is reducing for carbon and low-alloy steels. For high-alloy steels the control effected by the endo-gas atmosphere depends on the values of equilibrium constants: $K_1 = P_{H_2}/P_{H_2O}$ and $K_2 = P_{CO}/P_{CO_2}$, both functions of temperature. The corresponding sums of partial pressures are:

$$P_{H_2} + P_{H_2O} \simeq 0.41$$

and:

$$P_{CO} + P_{CO_2} \simeq 0.21 .$$

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E071/E380

Theoretical Basis ....

The interaction of the endo-gas atmosphere with steel in carburizing or decarburizing depends on the direction of two reactions:

$$H_2O + C_{(graphite)} = CO + H_2 \qquad (3)$$

$$K_3 = \frac{P_{CO} \cdot P_{H_2}}{P_{H_2O}} \quad \text{and}$$

$$H_2O + C_{(\gamma\text{-}Fe)} = CO + H_2 \qquad (4)$$

$$K_4 = \frac{P_{CO} \cdot P_{H_2}}{P_{H_2O} \cdot a_C} = \frac{r}{a_C}$$

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Theoretical Basis ....

where a_c - activity of carbon dissolved in the austenite. The activity of carbon equals unity for saturated austenite on the austenite-graphite boundary. Therefore, $K_4 = K_3$ or $r = K_3 a_c$, where r - new value of the ratio $P_{CO} \cdot P_{H_2} / P_{H_2O}$ for the equilibrium of carbon with austenite of a given composition at $a_c < 1$. Using the latter equation, the author constructed an equilibrium diagram for the system $CO - H_2 - H_2O - C_{(\gamma\text{-Fe})}$ (Fig. 1). This diagram was constructed taking into consideration the activity of carbon taken from Ref. 7 (Smith, R.P. - Journal American Chem.Soc., v. 68, No. 7, 1946). On the basis of the most accurate data available, the author found an equation for the temperature-dependence of the equilibrium constant for reaction (3):

Theoretical Basis ....

$$\lg K_3 = -7080T^{-1} - 7.440 .$$

This equation was used for the construction of the diagram in which r (and lgr) is plotted against - 1/T . Two additional scales are given on the righthand-side for % H_2O corresponding to:

$$P_{H_2} + P_{H_2O} + P_{CO} = 1$$

and

$$P_{H_2} + P_{H_2O} + P_{CO} = 0.41 .$$

The water-vapour content was determined from the equation:

$$P_{H_2O} = P + 2K_3 - 2\sqrt{K_3^2 + K_3 P} .$$

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Theoretical Basis .....

The diagram has three fields corresponding to the following fields in the iron-cementite equilibrium diagram:
1) $\gamma + Fe_3C$ - field of carburization;
2) γ - field of equilibrium between steel of a certain carbon concentration in the austenite and an atmosphere of corresponding composition; this is also the field of decarburization for steel with a higher carbon concentration in the austenite;
3) $\gamma + \alpha$ - field of decarburization to pure ferrite. Using the equilibrium diagram, the humidity of the endo-gas required to obtain any desired carbon concentration in the surface layer of steel can be established as a function of temperature. The presence of methane in the endo-gas leads to a decrease in the equilibrium constant of water vapour. The atmosphere of the type $CO - H_2 - H_2O - CH_4$ (with an addition of 5-10% methane) is a gaseous carburizing agent. Such an atmosphere (used in the first period of treatment or in the first zone of a continuous furnace) in combination with the atmosphere $CO - H_2 - H_2O$

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Theoretical Basis ....

(second period, or second zone of a continuous furnace) can be used for the carburization of steel and permits an automatic control of carbon concentration in the surface layer of steel. A few examples of the use of the diagram are given. There are 2 figures and 14 references: 9 Soviet and 5 non-Soviet. The four latest English-language references quoted are: Ref. 1 - R.I. Perrine - Metal Progress, v. 65, No. 5, 1954; N.K. Koebel - Metal Progress, v. 61, No. 2, 1954; Steel Processing, v. 41, No. 4, 1955; Metallurgia, v. 52, No. 309, 1955.

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14(5) PHASE I BOOK EXPLOITATION SOV/1944

Akademiya nauk SSSR. Institut gornogo dela

Nauchnyye problemy vskrytiya i razrabotki mestorozhdeniy poleznykh iskopayemykh (Scientific Problems in Developing and Exploiting Mineral Deposits) Moscow, Izd-vo AN SSSR, 1959. 333 p. 3,000 copies printed. Errata slip inserted.

Resp. Ed.: N.V. Mel'nikov, Corresponding Member, USSR Academy of Sciences; Ed. of Publishing House: Yu.F. Vasil'yev; Tech. Ed.: P.S. Kashina.

PURPOSE: This book is intended for coal and ore mining engineers.

COVERAGE: The collection of articles reports on the results of scientific studies conducted by members of the Institute of Mining Industries of the AN SSSR on problems of developing and exploiting coal and ore deposits. The book is divided into two parts. Part I discusses the development and exploitation of coal deposits, the trends in developing underground and surface exploitation methods, the scientific bases and principles applied in selecting exploitation methods for different natural conditions, the determination of the basic elements in the use of modern mechanized equipments in underground development, and the preparation and exploitation of coal. Part II is devoted to problems in the development and exploitation of ore deposits, the draining and mining methods used in underground exploitation of deposits in the area of the KMA (Kursk Magnetic Anomaly), the open pit mining method used in exploiting the rich KMA ores, the determination of size of ore, and further ore dressing. The book is dedicated to Academician Lev Dmitriyevich Shevyakov, mining engineer. The articles are accompanied by diagrams, tables, and bibliographic references.

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